Vertebrates

There are 636 vertebrate species that have been documented in Montana. Sixty of these were determined to be Tier I (greatest need of conservation), 143 Tier II (moderate conservation need), 281 Tier III (lower conservation need), and 152 Tier IV (non-native, peripheral).

Fish

White Sturgeon (Kootenai River Population) (*Acipenser transmontanus*)

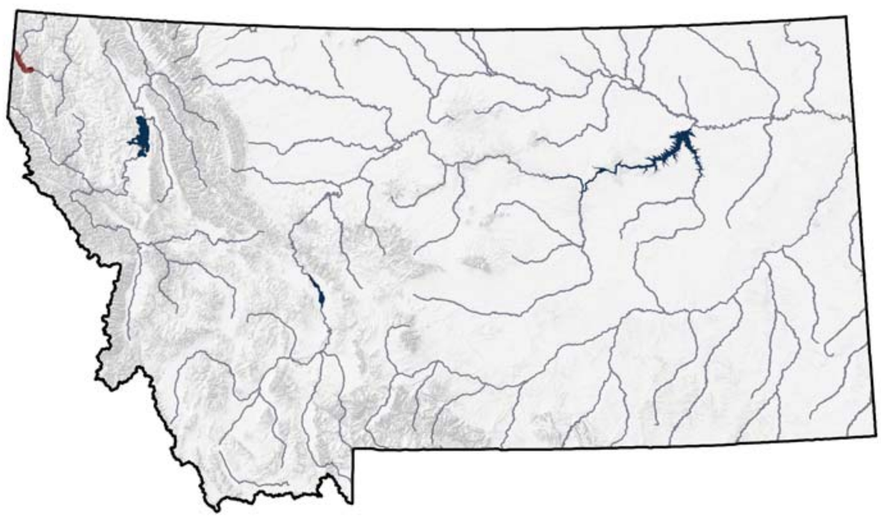

Figure 44. Distribution of the White Sturgeon

Range

The white sturgeon's range extends from Kootenai Falls in Montana, located 50 river kilometers downstream of Libby Dam, to the Corra Linn Dam at the outlet from Kootenay Lake in British Columbia. A natural barrier at Bonnington Falls downstream of Kootenay Lake has isolated the white sturgeon in the Kootenai River from other populations in the Columbia River since the last ice age approximately 10,000 years ago (Alden 1953; Northcote 1973; Duke et al. 1999; USFWS 1999) (AFS website 2003).

Habitat

The white sturgeon is landlocked in Montana and lives in the large, cool Kootenai River.

Management

Recovery of the white sturgeon population in the Kootenai River is contingent upon reestablishing natural recruitment, minimizing additional loss of genetic variability, and successfully mitigating biological and habitat alterations that continue to harm the population. Refer to the White Sturgeon Recovery Plan (USFWS 1999) for specific details promoting management of white sturgeon. The Kootenai River White Sturgeon Study and Conservation Aquaculture Project was initiated to preserve the genetic variability of the population, begin rebuilding natural age class structure, and prevent extinction while measures are implemented to restore natural recruitment (Anders and Westerhof 1996, USFWS 1999, Ireland 2000, Ireland et al. 2001 in press). A breeding plan has been implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding population (Kincaid 1993). The implementation of the breeding plan includes measures to minimize potential detrimental effects of conventional stocking programs (AFS website 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Reduced spring flows, unnatural flow fluctuations, and altered thermal regime caused by Libby Dam operation, which may have interrupted spawning behavior and recruitment	Coordinate flow fluctuations in Libby Dam as more natural to enhance natural production
A suite of post-fertilization early life mortality factors (embryo suffocation, predation on early life stages, resource limitations) and possible intermittent female stock limitation have been reported as possibly contributing to observed recruitment failure for Kootenai River white sturgeon	Management of non-native species that may prey on young white sturgeon
	Implement a conservation aquaculture program to prevent extinction and preserve genetic variability
Habitat conditions in the spawning areas may also affect spawning and rearing success. Cessation of periodic flushing flows has allowed fine sediments to build up in the Kootenai River bottom substrates. Fine sediments fill interstitial spaces in riverbed cobbles, reducing fish egg survival, larval and juvenile fish security, cover, and insect production	Decrease fine sediments found in lake area

	Habitat conservation of surrounding terrestrial habitat
	Reestablish suitable habitat conditions to increase white sturgeon survival past the embryonic and larval stages

Management Plan

U.S. Department of the Interior, Fish and Wildlife Service. 1999. White Sturgeon: Kootenai River Population Recovery Plan. Region 1, USFWS, Portland, OR.

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Pallid Sturgeon (*Scaphirhynchus albus*)

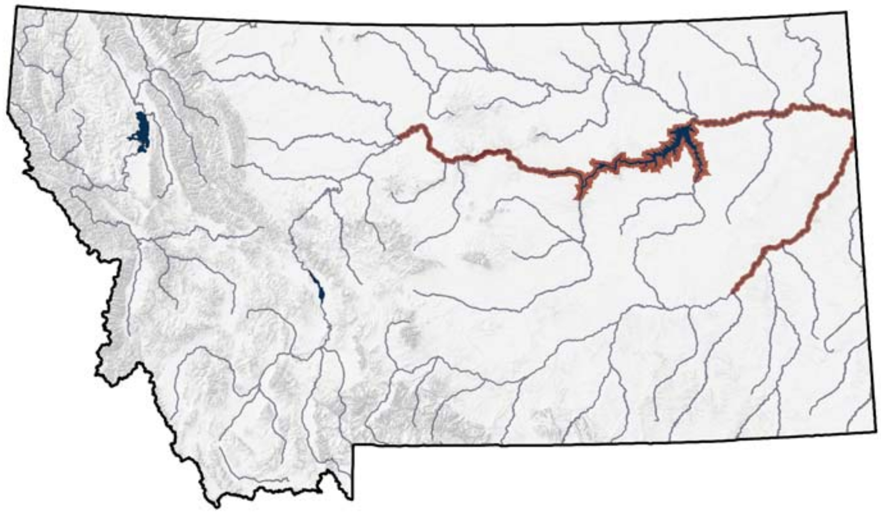

Figure 45. Distribution of the Pallid Sturgeon

Range

The pallid sturgeon is native in major rivers in eastern Montana including the Missouri River below Fort Benton and the Yellowstone River below the Carterville Diversion Dam near Forsyth.

Habitat

Pallid sturgeon use large, turbid rivers over sand and gravel bottoms, usually in strong current. In Montana, pallid sturgeon use large turbid streams including the Missouri and Yellowstone rivers (Brown 1971; Flath 1981). They also use all channel types, primarily straight reaches with islands (Bramblett 1996). They primarily use areas with substrates containing sand (especially bottom sand dune formations) and fines (93 percent of observations) (Bramblett 1996). Stream bottom velocities range between 0.0 and 1.37 meters per second, with an average of 0.65 meter per second (Bramblett 1996). Depths used are 0.6 to 14.5 meters, averaging 3.30 meters, and they appear to move deeper during the day (Bramblett 1996). Channel widths from 110 to 1,100 meters are used and average 324 meters (Bramblett 1996). Water temperatures used range from 2.8 to 20 degrees C. (Tews 1994; Bramblett 1996). Water turbidity ranges from 12 to 6,400 NTU (Turbidity Units) (Tews 1994).

Management

Beginning in 1996, research efforts focused on pallid sturgeon recovery and preserving the pallid sturgeon genetic pool through stocking. The primary purpose of the stocking program is to preserve the genetic pool and reconstruct an optimal population size within the habitat's carrying capacity (Krentz 1997a) (AFS website 2003). In 2000 the U.S. Fish and Wildlife Service (USFWS) completed an Endangered Species Act consultation with the U.S. Army Corps of Engineers regarding operation of Missouri River dams. Through an informal agreement the U.S. Bureau of Reclamation (BOR) has agreed to provide a dominant discharge spring pulse out of the Tiber Reservoir every four to five years for Missouri River fish migrations that could help the Upper Missouri River pallid sturgeon population. To address pallid sturgeon passage and entrainment on the Yellowstone River, the USFWS has begun consultation with BOR regarding problems at the Intake Diversion Dam. The future for pallid sturgeon recovery may continue to be uncertain even after positive changes have been implemented because pallid sturgeon populations are so depleted and the newly stocked fish will take at least 15 years before the females first reach sexual maturity and begin to spawn. Therefore, it is important to realize that immediate evaluations are impractical, and recovery will take a dedicated, long-term commitment (AFS website 2003). Implementing the pallid sturgeon recovery program in this area is a multistate and multiagency task. To facilitate this, the Montana/Dakota Pallid Sturgeon Work Group was organized in 1993. The group is composed of representatives from FWP, NDGF, USFWS, USBOR, WAPA, and PPL-MT, and acts in an advisory role identifying research needs and funding sources, developing work plans, and providing an opportunity for communication between biologists and agency personnel (AFS website 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat modifications such as dams prevent movement to spawning and feeding areas, alter flow regimes, turbidity, and temperature, and reduce food supply	Restore more natural flow and temperature conditions in the rivers below mainstream and tributary dams
	Protect minimum instream flow reservations to ensure that the pallid sturgeon population will not be harmed
Upstream and nearby land use practices may degrade water quality	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
Heavy metals and organic compounds may affect reproduction	Work with agencies, organizations and public to identify and reduce point source pollutants
Hybridization with shovelnose sturgeon, possibly caused by reductions in habitat diversity	Support research to better understand hybridization issues as they relate to habitat

Low population numbers	Establish multi-aged pallid sturgeon populations in the Middle Missouri, Lower Missouri, and Yellowstone rivers to prevent extinction
	Improve knowledge of pallid sturgeon life cycle requirements and continue to research limiting factors affecting its existence

Management Plan

Dryer, M. P., and A. J. Sandvol. 1993. Recovery plan for the pallid sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service. Bismarck, ND. 55 pp.

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Paddlefish (*Polyodon spathula*)

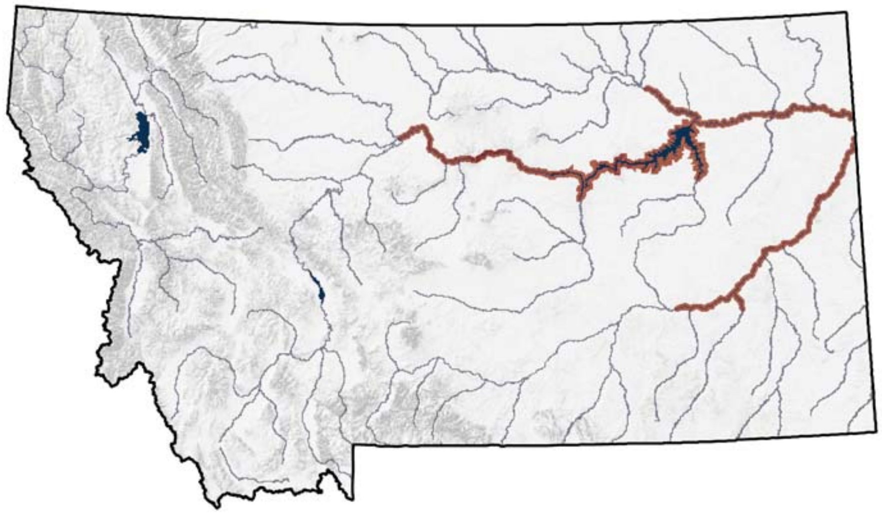

Figure 46. Distribution of the Paddlefish

Range

In Montana, two distinct paddlefish stocks are recognized. The Yellowstone-Sakakawea stock is distributed from the eastern boundary of the state up the Yellowstone River westward to the Cartersville Diversion Dam at Forsyth, as well as up the Missouri River westward to Fort Peck Dam (Scarnecchia et al. 1996b; Holton 2003). Most fish of this stock rear in Lake Sakakawea, a Missouri River mainstem reservoir in North Dakota (Fredericks and Scarnecchia 1997; Scarnecchia et al. 1997), and ascend the two rivers (mainly the Yellowstone) into Montana in spring to spawn (Firehammer 2004). Upriver distribution is more westerly in years of higher discharge. A few fish reside year-round in the dredge cuts below Fort Peck Dam. An important recreational snag fishery exists for this stock at the Intake Diversion Dam, near Glendive (Montana-North Dakota Paddlefish Management Plan 1995). Other sites on the Yellowstone River (e.g., Sidney Bridge, Richland Park, State Line) and on the Missouri River below Fort Peck Dam (e.g., Wolf Point, Frazer Rapids) also are fished. A modest bow-and-arrow fishery also exists in the dredge cuts.

The Fort Peck stock is distributed from Fort Peck Dam up the Missouri River westward at least as far as the mouth of the Marias River (Berg 1981). Most fish of this stock rear in the Fort Peck Reservoir and ascend the river in spring to spawn. Upriver distribution is more westerly in years of higher discharge. Since the closure of Fort Peck Dam, Fort Peck stock fish have been isolated from fish below the dam, although some upriver fish can pass downstream. An important recreational snag fishery exists for this stock at several sites near the Fred Robinson Bridge (Scarnecchia et al. 2000).

Habitat

The paddlefish is a large river species that utilizes a wide variety of habitats seasonally and at different life stages. Optimal spawning habitat consists mainly of turbid, faster flowing main channel areas with gravel substrates, whereas feeding habitat is typically slower moving backwaters, side channels, and sloughs where their zooplanktonic food is more abundant. In the twentieth century, Montana's paddlefish have adapted successfully to feeding in Missouri River reservoir habitat, resulting in an increased population size over historical (pre-reservoir) levels (Scarnecchia et al. 1996b). Young-of-the-year paddlefish utilize turbid headwater reaches of Fort Peck Reservoir (Kozfkay and Scarnecchia 2002) and Lake Sakakawea (Fredericks and Scarnecchia 1997) for particulate feeding. Larger juveniles and adults large enough to more effectively avoid predation (Parken and Scarnecchia 2002) filter feed throughout the reservoirs.

Management

Historical information on the Yellowstone-Sakakawea stock and fisheries in the Yellowstone River is provided in Robinson (1966), Rehwinkel (1978), and a series of Federal Aid reports (e.g., Stewart 1984) as summarized in the Montana-North Dakota Paddlefish Management Plan (1995) and Scarnecchia and Stewart (1996). Socioeconomic information on paddlefish anglers is provided in Scarnecchia et al. (1996) and Scarnecchia and Stewart (1997). Recent harvest data is summarized in a series of Federal Aid reports (e.g., Riggs 1999). Historical information on the Fort Peck stock and fisheries is provided by Berg (1981) and a series of Federal Aid reports (e.g., Needham 1984; Gilge and Liebelt 2001). Some of the latter reports also provide information on the Yellowstone-Sakakawea stock fish inhabiting the dredge cuts. Socioeconomic information on the Fort Peck stock fishery is provided in Scarnecchia et al. (2000).

Montana's goals, objectives, and approaches for paddlefish management are outlined in the Montana-North Dakota Paddlefish Management Plan (1995). This plan is being revised and updated as of 2005. Management of the Yellowstone-Sakakawea stock is a cooperative, interstate effort involving coordinated and uniform management goals, objectives, data collection, and stock assessment by the Montana Department of Fish, Wildlife & Parks and the North Dakota Game and Fish Department. For the Fort Peck stock, which is located entirely within Montana, management goals, objectives, data collection, and stock assessment are designed where possible to be consistent with that of the Yellowstone-Sakakawea stock.

Harvest management for both stocks is designed to prevent overharvest and ensure sustainable wild fisheries. An extensive data collection program for the Yellowstone-Sakakawea stock has permitted a more rigorous scientific approach to harvest management. A harvest cap of 1,000 fish per state per year is intended to stabilize the population at its present level of about 30,000 adult fish. The harvest cap is considered a maximum acceptable harvest rather than a target catch to be met. The number of fish allowed to be harvested is based on a straightforward harvest model involving determination of population size and age structure. Population size is estimated based on jaw-tag recoveries from adult fish. Biologists accurately estimate and validate the ages of the fish caught in the fishery (Scarnecchia et al. 2005) to ensure that young adult fish are added and old fish are retained in the stock. The harvest cap is set to not exceed the most recent five-year estimated recruitment of young adults (ages 10 to 14 males and ages 17 to 21 females). Monitoring and stock assessment approaches for the Fort Peck stock (including population estimation and age determination) are being developed to permit the implementation of a similar approach to harvest management for that stock. No harvest cap for that stock currently exists.

Harvest regulations differ for the two stocks. For the Yellowstone-Sakakawea stock, harvest regulations on the Yellowstone River include an open season from May 15 through June 30, or until the harvest cap is reached. In the Missouri River below Fort Peck Dam, harvest is open all year or until the harvest cap is reached. All snagged paddlefish must be retained and tagged with a locking, individually identifiable paddlefish tag purchased by the angler. The annual bag limit for this stock is one fish per person. Catch-and-release fishing (with mandatory release), which when monitored has been shown to not cause excessive mortality (Scarnecchia and Stewart 1997b), is also permitted for two six-hour periods per week at the Intake fishing site. For the Fort Peck stock, anglers may harvest up to two fish per year (but only one if the angler already caught one from the Yellowstone-Sakakawea stock). The season is open all year, and high-grading (immediate release of captured fish) is permitted (Montana Department of Fish, Wildlife & Parks 2005). No limit is set on the total number of tags sold for either stock.

For both stocks, extensive collection of harvest data as well as adult tagging and juvenile monitoring are conducted to obtain information on age composition, population size, reproductive success, and recruitment of young adult fish. On-site and telephone creel surveys provide additional information on the fishery and harvest.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Loss of spawning habitat. Paddlefish spawn most effectively in turbid, free-flowing rivers with natural hydrographs and gravel, cobble, and perhaps sand substrates	Maintenance of instream flows and spawning habitat in large rivers (especially the Yellowstone River and Missouri River above Fort Peck Reservoir)

Water depletions. Excessive and increasing water depletions for irrigation during drought or low-flow years influence paddlefish migratory and spawning behavior. Adequate flows in spring and early summer are needed to initiate spawning migrations	Increased reservoir water retention during times of drought
Potential introduction of exotic competitors (e.g., bighead carp [Aristichthys nobilis])	Improved public awareness of paddlefish conservation concerns and impacts of non-native species
Overfishing. Although much progress has been made to prevent legal overfishing, vigilance is needed to prevent illegal harvest	Improving harvest management

Management Plan

Montana-North Dakota Paddlefish Management Plan. 1995. North Dakota Game and Fish Department and Montana Department of Fish, Wildlife & Parks. Bismarck, ND, and Helena, MT.

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Shortnose Gar (*Lepisosteus platostomus*)

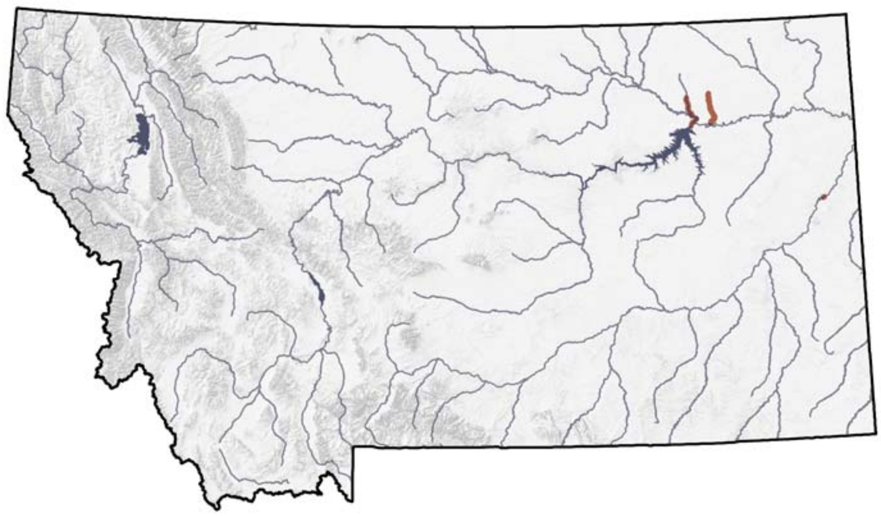

Figure 47. Distribution of Shortnose Gar

Range

The distribution of the shortnose gar within Montana is very limited, with its presence being documented primarily in the Missouri River dredge cuts downstream of Fort Peck Dam (Brown 1971; Holton 2003). The only other documented observation of shortnose gar in Montana is a single specimen collected on the Yellowstone River approximately 15 miles upstream of its confluence with the Missouri River in 1998 (K. Kapuscinski, FWP, personal communication, February 2003) (AFS website 2003).

Habitat

Due to its limited distribution little is known about the shortnose gar within Montana. The shortnose gar is typically found in large rivers, quiet pools, backwaters, and oxbow lakes. It has a higher tolerance to turbid water than the other four gar species found in North America. Gar also have the unique ability to supply a highly vascularized swim bladder with supplemental oxygen by engaging in a behavior of "breaking," where air is gulped at the surface (Pflieger 1975). This allows gar to occupy waters with extremely low dissolved oxygen concentrations, which would not be suitable for most other fish inhabitation.

Management

Due to low numbers and poor quality flesh, the shortnose gar is not considered a sport fish in Montana (AFS website 2003). There is no management plan for the shortnose gar in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Limited information in Montana	Consider preparing a management plan for the shortnose gar or include it into other comprehensive taxonomic plans
Limited habitat used in Montana	Increase survey and monitoring efforts
Backwater habitat filled in for agriculture and modified by lack of channel maintenance flows	Increase conservation initiatives for backwater sloughs and channels
Cold water release, lack of turbidity, and artificial hydrograph below Fort Peck Dam may inhibit abundance in the lower Missouri River	Regulate water regimes to be more closely tied to natural water regimes

Management Plan

None

Citations

American Fisheries Society Montana Chapter website: http://www.fisheries.org/AFSmontana/SSCpages/Shortnose%20Gar%20Status.htm

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Pflieger, W. L. 1975. The fishes of Missouri. Missouri Department of Conservation, Jefferson City, MO.

Yellowstone Cutthroat Trout (*Oncorhynchus clarki bouvieri*)

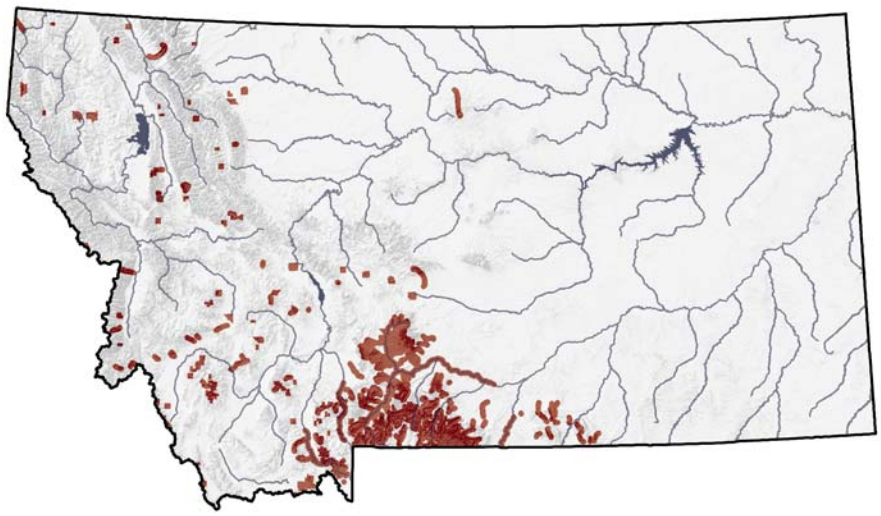

Figure 48. Distribution of the Yellowstone Cutthroat Trout (includes introduced populations)

Range

Historically, the Yellowstone cutthroat trout was believed to have occupied much of the Yellowstone River basin, including portions of the Clarks Fork of the Yellowstone River, Bighorn River, and Tongue River basins in Montana and Wyoming, and parts of the Snake River basin in Wyoming, Idaho, Utah, and Nevada (Behnke 1992). The lower portions of some primary stem rivers (e.g., the Tongue River) may have been too warm to support populations. Range wide, Yellowstone cutthroat trout have undergone substantial declines in distribution and abundance. Populations in Utah and Nevada are limited to one to two basins (May 1996). Based on a survey of biologists, May (1996) concluded that in Idaho, Yellowstone cutthroat trout occupied 43 percent of their historical range, in Wyoming, 42 percent, and in Montana, 32 percent. Most remaining indigenous populations in Montana inhabit headwater streams, though the Yellowstone River primary stem also supports large numbers of this subspecies. More recent estimates suggest that in Montana, 10 percent of the historically occupied fluvial habitat still contains genetically pure populations (May 1998; Anonymous 1999). Yet all these estimates must be regarded as approximations because many waters in its historical range were probably barren of fish because of barriers to upstream migration (May 1996; Dufek et al. 1999). Also, stocking in previously barren waters in historically occupied basins has been commonplace. For example, in Montana only 2 to 6 lakes historically were occupied, whereas more than 100 lakes now support genetically pure Yellowstone cutthroat trout (May 1996; May et al. 1998). Finally, recent comprehensive field surveys of Montana waters are lacking. Similar surveys in northwestern Wyoming outside Yellowstone National Park revealed that of 1,700 kilometers of potential historical habitat, only 245 kilometers contained reasonably genetically pure Yellowstone cutthroat trout distributed in four populations, all of which had been exposed to introgression with Snake River fine-spotted cutthroat trout (Kruse et al. 2000).

Habitat

Yellowstone cutthroat trout inhabit relatively clear, cold streams, rivers, and lakes. Optimal temperatures have been reported to be from 4 to 15 degrees C., with occupied waters ranging from 0 to 27 degrees C. (Gresswell 1995) (AFS website 2003).

Management

To maintain healthy populations of Yellowstone cutthroat trout and to ensure the wide-ranging persistence of this subspecies in Montana and elsewhere, a number of tactics have been proposed in recent status assessments (Yellowstone Cutthroat Trout Working Group 1994; Gresswell 1995; May 1996; May et al. 1998; Anonymous 1999; Dufek et al. 1999; Wyoming Game and Fish Department 2000). Please refer to these assessments for more information.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Persistence of non-native fish	Continue field surveys and monitioring
	Continue harvest management of non-native trout
Widespread stocking of non-indigenous populations of Yellowstone cutthroat trout	Decrease stocking of non-indigenous Yellowstone cutthroat trout to decrease genetic homogenization
	Decrease stocking of non-native trout
Susceptibility to infection by Myxobolus cerebralis, a European protozoan and the causative agent of whirling disease	Increased funding for studying whirling disease
Tributary dewatering by unsustainable irrigation practices	Decreased channels and irrigation developments
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores beneficial fish passage
River channelization or riprap	Work with new stabilization projects to reduce impacts and support efforts to restore existing rip-rap areas to natural condition

Range, forest, or mining management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)

Management Plans

Cooperative Conservation Agreement for Yellowstone Cutthroat Trout within Montana between Crow Tribe, Montana Department of Fish, Wildlife & Parks (FWP), Montana Department of Environmental Quality (DEQ), Montana Department of Natural Resources and Conservation (DNRC), USDA Forest Service–Northern Region, Gallatin and Custer national forests, USDI Bureau of Land Management–Montana (BLM), USDI Fish and Wildlife Service (FWS), USDI Bureau of Indian Affairs (BIA), Yellowstone National Park. 2000. Montana Department of Fish, Wildlife & Parks.

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Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)

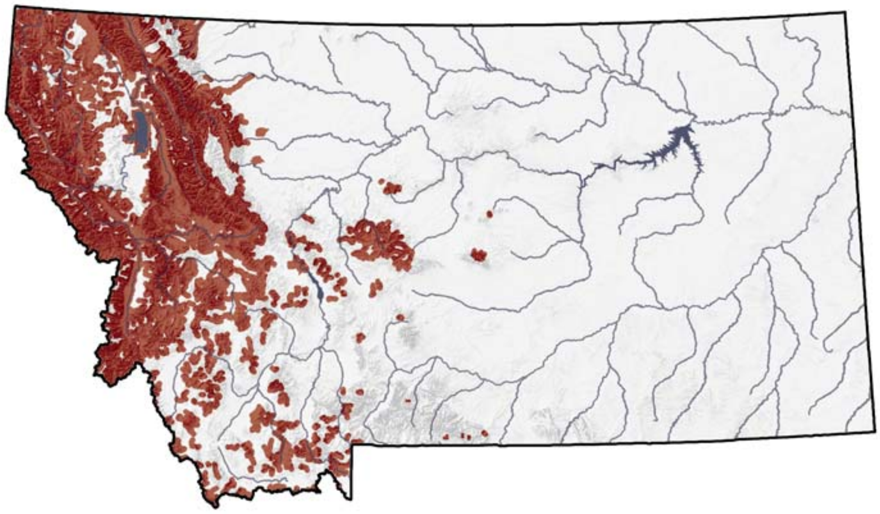

Figure 49. Distribution of the Westslope Cutthroat Trout (includes introduced populations)

Range

The westslope cutthroat trout is found in the Kootenai watershed, the Clark Fork watershed, the headwaters of the Missouri River, and the headwaters of the Saskatchewan River. Westslope cutthroat trout were first described by Lewis and Clark and were once extremely abundant. Unfortunately, the species has lost a lot of ground. Various studies have estimated that the westslope cutthroat trout now only occupies between 19 to 27 percent of its historical range in Montana and about 36 percent of its historical range in Idaho (Van Eimeren 1996). In addition, westslope cutthroat trout can hybridize with other cutthroat trout subspecies and rainbow trout. Thus, genetically pure westslope cutthroat trout are estimated to exist in only 2 to 4 percent of their historical stream distribution (McIntyre and Rieman 1995). East of the Continental Divide, westslope cutthroat trout are confined to headwater reaches, and most of these small populations face an extremely high risk of extinction (AFS website 2003).

Habitat

Spawning and rearing streams tend to be cold and nutrient poor. Westslope cutthroat trout seek out gravel substrate in riffles and pool crests for spawning habitat. Cutthroat trout have long been regarded as sensitive to fine sediment (generally defined as 6.3 millimeters or less). Although studies have documented negative survival as fine sediment increases (Weaver and Fraley 1991), it is difficult to predict their response in the wild (McIntyre and Rieman 1995). This is due to the complexity of stream environments and the ability of fish to adapt somewhat to changes in microhabitat (Everest et al. 1987) (AFS website 2003).

Westslope cutthroat trout also require cold water, although it has proven elusive to define exact temperature requirements or tolerances. Likewise, cutthroat trout tend to thrive in streams with more pool habitat and cover than uniform, simple habitat (Shepard, Pratt, and Graham 1984). Juvenile cutthroat trout overwinter in the interstitial spaces of large stream substrates. Adult cutthroat trout need deep, slow-moving pools that do not fill with anchor ice in order to survive the winter (Brown and Mackay 1995) (AFS website 2003).

Management

Management of this species involves protecting the population strongholds and making tough decisions on restoration priorities for the depressed populations. The state of Montana has altered fishing regulations to reduce fishing mortality. Montana has also developed a conservation agreement signed by nine government agencies and conservation groups (Montana Department of Fish, Wildlife & Parks 1999). This agreement prioritizes protecting genetically pure populations first, then slightly introgressed populations. Recovering depressed populations will involve habitat restoration and the removal of non-native species. To a large degree management activities are different between the state west of the Continental Divide (focus on barriers and non-native trout) and east (focus on habitat restoration). Research suggests that it is not a good idea to bolster populations with stocked fish from other watersheds due to considerable genetic variation between watersheds (Leary, Allendorf, and Kanda 1998). It will be especially challenging to recover migratory individuals. Government agencies will need to work together to share expertise, pool financial resources, and monitor progress toward restoration of this species (AFS website 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss due to range, forest, mining, or agricultural management practices, residential development, and the impact of roads	Conservation of habitat, including better natural resource use practices
Fish spawning habitat loss due to dewatering of streams for irrigation and because of barriers created by dams and road culverts	
Overcompetition and predation by non-native species	Educate the public on need of westslope cutthroat trout
	Increase limits of non-native fish
	Removal of non-native fish where appropriate

Increased hybridization with other species	Continue to conserve genetically pure populations
	Creation of barriers to protect remaining populations
Isolated and small population sizes	Increase stock populations of genetically pure westslope cutthroat trout
	Reintroduction of westslope cutthroat trout
Overfishing	Reduce limits on westslope cutthroat trout

Management Plans

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Columbia Basin Redband Trout (*Oncorhynchus mykiss gairdneri*)

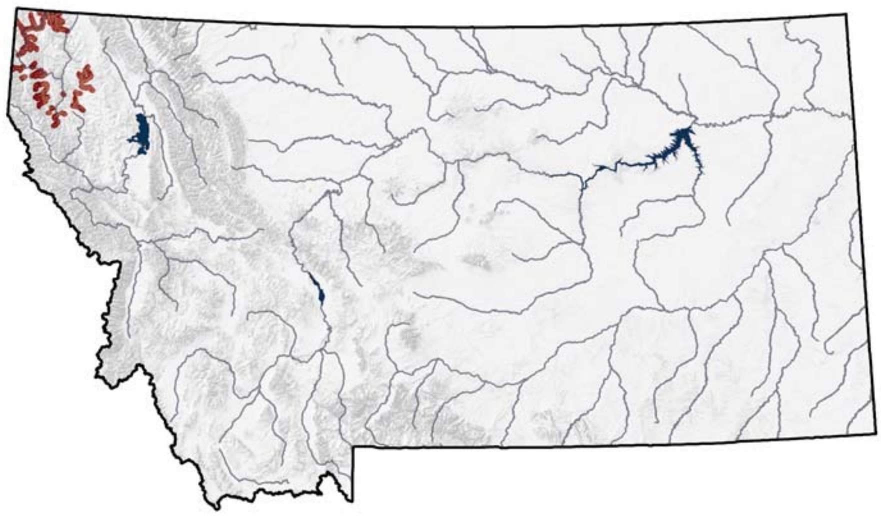

Figure 50. Distribution of the Columbia Basin Redband Trout

Range

The Kootenai River drainage population of the redband trout is Montana's only native rainbow trout and represents the farthest inland penetration of redband trout in the Columbia River Basin. Until recently, the upper distribution of redband trout in the Columbia River Basin was believed to extend upstream to Kootenai Falls, which was considered a barrier falls located approximately 8 kilometers east of Troy, Montana (Allendorf et al. 1980). Recent information suggests that the barrier was not Kootenai Falls, but one that existed in geologic time near the present-day Libby Dam or Fisher River (Hensler et al. 1996).

Presently, populations of redband trout have been identified using starch gel electrophoresis in the following streams in the Kootenai River drainage in Montana: Callahan Creek, North Fork Yaak River and East Fork Yaak River, upper Libby Creek and several tributaries, and several tributaries of the Fisher River including Wolf Creek (Allendorf et al. 1980; Leary et al. 1991; Huston 1995; Hensler et al. 1996; M. Hensler, MFWP, personal communication).

Results of genetic surveys indicate that redband trout historically preferred low-gradient valley-bottom streams throughout the Kootenai River drainage but are presently restricted to headwater areas or streams with barriers. Allendorf et al. (1980) concluded that the redband trout is a native rainbow trout to the Kootenai River in Montana, and that "planting of hatchery rainbow trout has created a situation of tremendous genetic divergence among local populations" (e.g., hybridization).

Kootenai redband trout are effectively separated into two primary regions: those below Kootenai Falls and those above. Fish known to inhabit these streams may mix downstream but are unlikely to traverse up the falls (Chapman 1986). Below Kootenai Falls, redband trout inhabiting Callahan Creek and the upper Yaak River drainage are isolated into two separate regions by Yaak River Falls, a falls-chute barrier located 4 kilometers from the mouth of Callahan Creek, and a barrier falls located in the lower East Fork of the Yaak River. These remnant populations, which are spatially fragmented and isolated from genetic exchange, represent the only known remaining sources of native redband trout capable of refounding their historical distribution in Montana downstream of Kootenai Falls.

There are no barriers to protect redband trout from hybridization upstream of Kootenai Falls. Still, there are several tributaries to the Fisher River drainage and Libby Creek drainage that maintain non- or nearly nonintrogressed populations and could be used for refounding if necessary (M. Hensler, MFWP, personal communication).

Perkinson (1993) hypothesized that of 300 kilometers of habitat originally used by redband trout in Montana, only 100 kilometers (33 percent) of their historical range is presently occupied by a stock that is at least 95 percent pure. More recent genetic evaluation of the species showed that the historical range was more on the order of 1,200 kilometers and current range, 493 kilometers. The current distribution includes instances where redband trout are sympatric with westslope cutthroat trout. These populations show small first-generation hybridization and almost no post-first-generation hybridization. Approximately 152 kilometers, or 13 percent, of the historical distribution remains as sources of native redband trout due to barriers in the Callahan Creek and Yaak River drainages.

Habitat

The seasonal habitat requirements of redband trout in the Kootenai River drainage in Montana were investigated during 1997 and 1998 (Hensler and Muhlfeld 1999; Muhlfeld 1999; Muhlfeld et al. 2001 in-press). Summer results demonstrated that juvenile (36 to125 mm) and adult (less than 126 mm) redband trout prefer deep microhabitats (more than 0.4 m) with low to moderate velocities (less than 0.5 m/s) adjacent to the thalweg. Conversely, age-0 (less than 35 mm) redband trout select slow water (less than 0.1 m/s) and shallow depths (less than 0.2 m) located in lateral areas of the channel. All ages of redband trout strongly selected pools and avoided riffles; runs were used generally as expected (based on availability) by juveniles and adults and more than expected by age-0 redband trout. At the macrohabitat scale, a multiple regression model indicated that low-gradient, midelevation reaches with an abundance of complex pools are critical areas for the production of redband trout. Mean reach densities ranged from 0.01 to 0.10 fish/m^2. During the fall and winter period, adult redband trout occupied small home ranges and found suitable overwintering habitat in deep pools with extensive amounts of cover in headwater streams. In Basin Creek, adult redband trout commenced spawning (e.g., redd construction) during June as spring flows subsided following peak runoff. Redband trout generally selected redd sites in shallow pool tail-out areas (mean depth = 0.27 m; range: 0.20 to 0.46) with moderate water velocities (mean velocity = 0.50 m/s; range: 0.23 to 0.69 m/s) dominated by gravel substrate.

Management

Long-term conservation and management of this subspecies will require state and federal agencies to develop a comprehensive plan to protect and restore redband trout throughout their native range in Montana. Montana Fish, Wildlife & Parks (MFWP) and the U.S. Forest Service and local conservation groups have scheduled future habitat improvement and conservation efforts for the foreseeable future.

Another objective should be the consideration of reintroductions throughout the Kootenai River drainage in the redband trout's historical range. To that end, MFWP is in the process of assessing redband trout performance at the Libby Field Station and Murray Springs State Fish Hatchery and in two lakes (M. Hensler, personal communication). Reintroduction efforts should be implemented with caution. Introduction of a species to any aquatic habitat requires many considerations because species interactions are complex and difficult to predict (Li and Moyle 1981). Results of microsatellite analyses based on allozyme electrophoresis of several populations of redband trout in Montana and British Columbia indicate significant differences between watersheds and relatively small differences between populations within watersheds (Knudsen et al. 2002). In order for potential reintroduction programs to be genetically rational, drainage-specific stocks are needed for successful recovery programs.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Range and forest management practices, which include use of pesticides	Reduce stream intake of pesticides and herbicides
	Management of riparian zones and waters where redband trout reside
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores beneficial fish passage

	Consider preparing a management plan for the Columbia Basin redband trout or include it into other comprehensive taxonomic plans
Hybridization	Reduce stocking of non-native trout in sensitive areas
	Protect genetic composition by raising hatchery Columbian Basin redband trout
Geographical restricted range	Consider reintroduction efforts
	Habitat surveys in areas where reintroduction efforts could occur

Management Plan

None

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Bull Trout (*Salvelinus confluentus*)

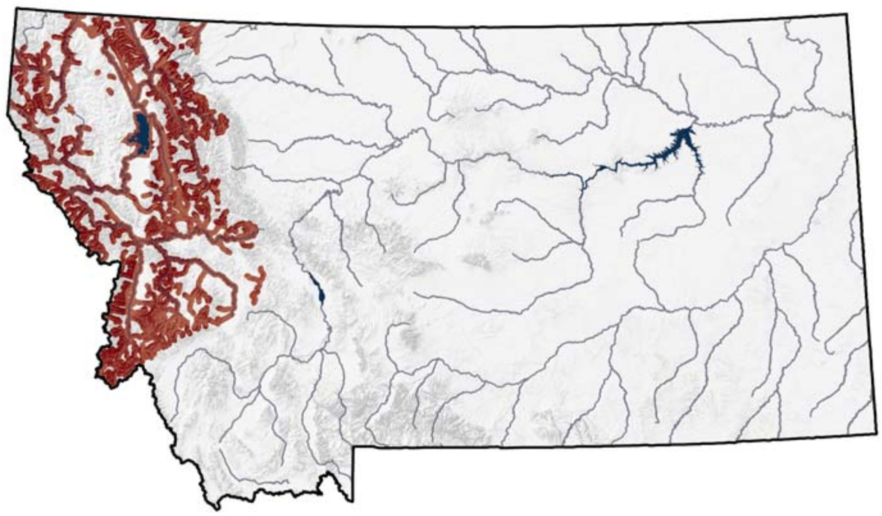

Figure 51. Distribution of the Bull Trout

Range

Montana populations of the bull trout are limited to the Columbia River and Saskatchewan River basins. Major bull trout drainages are the Kootenai River and Clark Fork River (including Bitterroot, Flathead/Swan and Blackfoot systems). Metaline Falls (Tom Weaver, FWP, personal communication) and Bonnington Falls have isolated the Clark Fork River and Kootenai River populations from downstream Columbia Basin populations for approximately 10,000-plus years (Montana Bull Trout Restoration Team (MBTRT) 2000). The St. Mary's River in the Saskatchewan basin, draining north into Canada, contains the only bull trout populations east of the Continental Divide in the United States.

Habitat

Subadult and adult fluvial bull trout reside in larger streams and rivers and spawn in smaller tributary streams, whereas adfluvial bull trout reside in lakes and spawn in tributaries. They spawn in cold headwater streams with clean gravel bottoms (Brown 1971; Holton 1981).

Management

Several studies report bull trout local population genetic divergence down to the geographic scale of adjacent tributaries (Leary et al. 1993; Kanda et al. 1997; Spruell et al. 1999; Taylor et al. 1999). Based on similar patterns of population genetic structure in steelhead, Parkinson (1984) suggested that populations in geographically adjacent streams be managed as separate stocks.

Because of their opportunistic feeding habits and late maturity, bull trout are vulnerable to overharvest and poaching/accidental harvest, especially during spawning migrations and when in tributaries (Leathe and Enk 1985; Long 1997; Schmetterling and Long 1999; Carnefix 2002). Some Montana bull trout populations (e.g., Swan, South Fork Flathead, Kootenai, and Blackfoot rivers) have responded well to more restrictive angling regulations or closures (Tom Weaver, FWP, personal communication), and initial conservation efforts in Montana focused on such measures. The first minimum length limit was imposed in 1951 (Long 1997). From 1953 to 1972, 11 of 33 major North and Middle Fork Flathead River spawning tributaries were closed to fishing, and an 18-inch minimum size limit was established in 1982 to protect pre-spawners in the rivers and Flathead Lake (Fraley et al. 1981; Deleray et al. 1999). Regulations closing all state waters except Swan Lake and the Hungry Horse Reservoir to intentionally fishing for and/or harvesting bull trout became effective in 1993 (Deleray et al. 1999). Harvest is currently permitted in Swan Lake, the Hungry Horse Reservoir (South Fork Flathead), and the Koocanusa Reservoir (Kootenai). Some level of poaching (Swanberg 1996; Long 1997) and accidental harvest due to misidentification (Schmetterling and Long 1999) probably continues to impact bull trout populations, but it is difficult to detect, quantify, prosecute, or prevent. Recent efforts to reduce misidentification include a bull trout identification and education webpage at the FWP website (http://fwp.state.mt.us/bulltroutid/default.htm).

The state of Montana began development of a bull trout restoration plan in 1993. The final plan, published in June 2000, identifies 115 bull trout core areas and connecting “nodal habitats” within 12 restoration/conservation areas (RCAs); sets goals, objectives, and criteria for restoration; outlines actions to meet those criteria; and establishes a structure to monitor implementation and evaluate effectiveness of the plan. The stated goal of the plan is “to ensure the long-term persistence of complex (all life histories represented), interacting groups of bull trout distributed across the species’ range and manage for sufficient abundance within restored RCAs to allow for recreational utilization” (MBTRT 2000). Bull trout conservation is also a stated goal of the Plum Creek Timber Company’s Native Fish Habitat Conservation Plan (HCP) (http://www.plumcreek.com/environment/HCP-fish.cfm), for which agreement was reached with the U.S. Fish and Wildlife Service (USFWS) in October 2000. Though approved, this HCP/take permit is currently in litigation.

With a “threatened” listing (USFWS 1998), USFWS has separate responsibility under the Endangered Species Act for development of a federal recovery plan and designation of critical habitat. A draft recovery plan built on the foundation of state restoration plans (USFWS 2002a, Internet-accessible at http://pacific.fws.gov/bulltrout/recovery/Default.htm) and proposed critical habitat (USFWS 2002b, http://pacific.fws.gov/bulltrout/criticalhab.htm) was released. Although all bull trout within the United States are now listed as threatened, this draft recovery plan and proposed critical habitat are organized hierarchically by “local populations” within “core areas” within “recovery subunits” within 24 “recovery units” within three (of five) designated “distinct population segments” (DPSs). The draft recovery plan covers the Klamath basin, Columbia River, and St. Mary-Belly River DPSs. Although extensive bull trout habitat was proposed for critical designation in Montana, including 5,341 stream kilometers (3,319 miles) and 88,051 hectares (217,577 acres) of lake and reservoir, the final critical habitat designation did not include any habitat in Montana. Ten local populations within four core areas have been identified within the Kootenai River Recovery Unit in Montana. About 119 local populations distributed among 36 core areas within three recovery subunits (Flathead, Upper Clark Fork, and Lower Clark Fork) are identified within Montana in the Clark Fork Recovery Unit. Nine local populations within six core areas are identified within Montana in the St. Mary-Belly River Recovery Unit.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat degradation and loss due to land and water management practices	Restoration of degraded habitat and preservation of existing healthy habitat
Loss of the migratory component of bull trout life history diversity by isolation and fragmentation of populations by both structural (e.g., dams) and environmental (e.g., thermal or pollution) barriers	Reestablish connectivity between habitats isolated by constructed barriers
Introduction of non-native fishes resulting in competition, predation, and hybridization threats	Increased management of non-native fishes
	Prevent illegal introductions of fish species
Historical overharvest and eradication efforts	Management of water bodies from overfishing
Ongoing poaching and accidental harvest due to misidentification	Education of what bull trout look like and where they are distributed

Management Plans

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Lake Trout (native lakes) (*Salvelinus namaycush*)

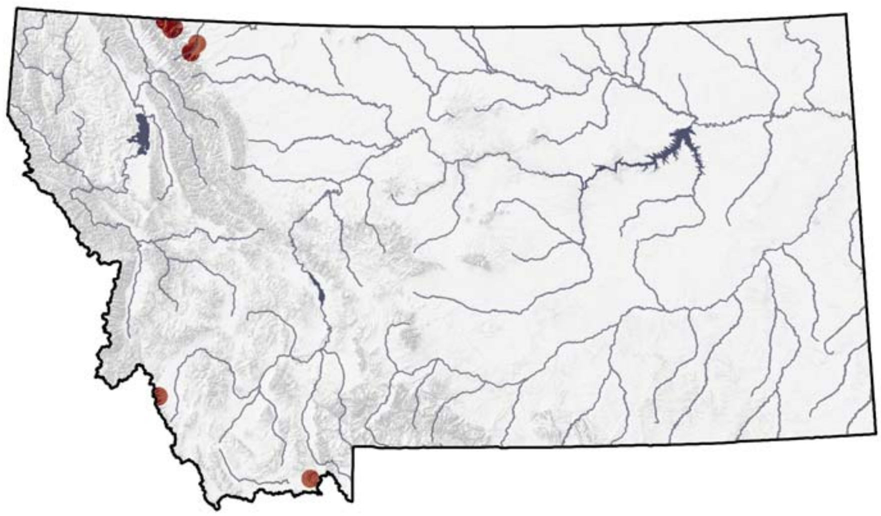

Figure 52. Distribution of Native Populations of Lake Trout

Range

Montana's native lake trout populations remain in Waterton Lake, Glenns Lake, Cosley Lake, and St. Mary Lake in Glacier National Park, and Lower St. Mary Lake in the Blackfeet Indian Reservation. All of these waters are in drainages that eventually reach the Hudson Bay. Other native populations occur in Twin Lake in the Big Hole River drainage and Elk Lake in the Red Rock River drainage, both tributaries to the upper Missouri River drainage. Although there are records of some stocking of lake trout into Cosley, Glenns, and Lower St. Mary lakes, mtDNA analysis by Wilson and Hebert (Wilson and Hebert 1998) gives evidence of the native status of the listed populations. Other lake trout populations in Montana are the result of legal and illegal introductions and are not remnant native populations.

Habitat

While the lake trout can be found in cold rivers and shallow lakes in the northern portion of its range (Scott and Crossman 1973) in Montana, native lake trout inhabit a few deep, cold lakes remaining from the Pleistocene glaciations. Lake trout prefer water temperatures in the 50- to 57-degree F range and, therefore, spend most of their lives in the deeper, benthic habitats with these water temperatures. Lake trout can occasionally be found in shallow water habitats, usually immediately after ice-out when surface waters are within their preferred temperature range. They spawn in the fall on the rocky substrate of the shoreline. Lake trout scatter or broadcast their spawn, a rarity in the trout group.

Management

Management recommendations within this document pertain only to the Elk Lake and Twin Lake populations. Little is known about the status of Montana's native lake trout populations. The populations in Waterton, Cosley, Glenns, and St. Mary lakes are afforded the protection of their location within Glacier National Park. The Waterton population is believed to be abundant and stable. (Leo Marnell, NPS, personal communication).

St. Mary Lake is a 3,500-acre lake at 4,473 feet above mean sea level. The St. Mary Lake population is believed to be abundant and stable. Lake trout are the most dominant fish species after lake whitefish. There are records of stocking lake trout into St. Mary Lake, so the genome of this population may contain exotic alleles. DNA analysis has been performed, but not reported, to identify the source stock for these introductions (Leo Marnell, NPS, personal communication; Robbin Wagner, USFWS, personal communication).

Some question whether the Glenns and Cosley lakes populations are native due to the location of a downstream high-barrier falls (Leo Marnell, NPS, personal communication). Holton and Johnson (1996) did not list these as native populations; however, Wilson and Hebert (1998) found that there is genetic evidence that the Cosley Lake haplotype is consistent with the other populations that formed the Alberta/Montana refuge. The Cosley and Glenns lakes populations also are believed to be stable. There are records of stocking lake trout of unknown origin into Cosley and Glenns lakes, so the genome of these populations may contain exotic alleles. DNA analysis has been performed, but not reported, to identify the source stock for these introductions (Leo Marnell, NPS, personal communication; Robbin Wagner, USFWS, personal communication).

Lower St. Mary Lake is located within the Blackfeet Indian Reservation. This population is stable and abundant. Lake trout are the most dominant fish species after lake whitefish and comprise 10 to 30 percent of the commercial lake whitefish catch. Again, there are records of stocking lake trout of unknown origin into Lower St. Mary Lake. Water level fluctuations and dewatering due to lake management for irrigation impacts this population (Robbin Wagner, USFWS, personal communication).

Elk Lake is a 283-surface-acre lake at 6,674 feet elevation with a maximum depth of 70 feet (USFS 2004). The lake trout population in Elk Lake is small (250 to 1,000 fish) and declining. This population has a poor age structure due to limited recruitment (Oswald, unpublished FWP data).

Twin Lake is a 75-surface-acre lake at 7,235 feet elevation with a maximum depth of 72 feet (USFS 2004). The Twin Lake population is also small (50 to 250 fish) and declining, with little recruitment (Oswald, unpublished FWP data).

The genetic uniqueness and significance of Montana's lake trout populations to the postglacial distribution of the species mandate that these remnant native populations be conserved.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Little information on native populations	Consider preparing a management plan for the lake trout (native lakes) or include it into other comprehensive taxonomic plans
Irregular recruitment	Increased monitoring and surveying
Genetic bottlenecks caused by small size of remaining populations	Reintroduce genetically pure native populations
Limiting factors unknown	Identify and remedy limiting factors

Management Plan

None

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Arctic Grayling (Thymallus arcticus)

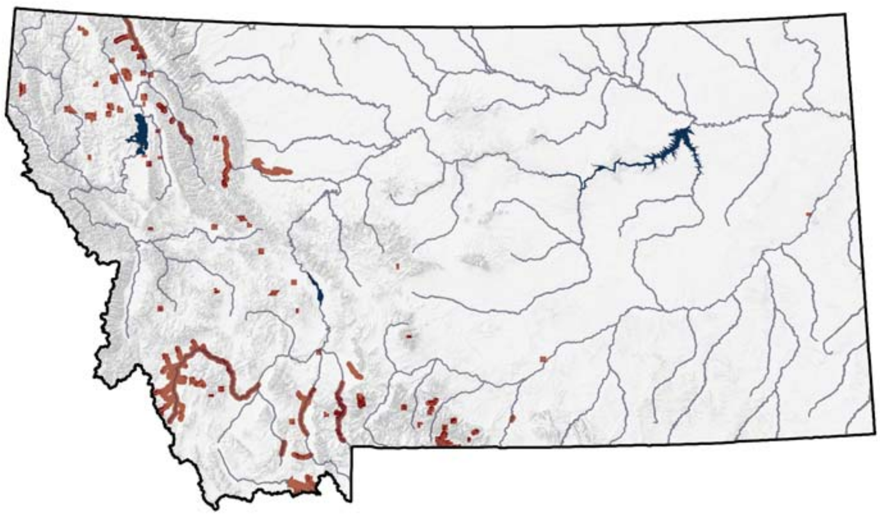

Figure 53. Distribution of the Arctic Grayling (includes introduced populations)

Range

At the end of the 19th century, fluvial arctic grayling were intermittently distributed throughout the upper Missouri drainage above Great Falls (Vincent 1962). During the 20th century, the range of fluvial arctic grayling has been restricted to the Big Hole River of southwest Montana, about 4 percent of its native range (Kaya 1992a). Vincent (1962) attributed the decline of fluvial arctic grayling throughout their native range to four factors: habitat degradation, introduction of non-native salmonids, climatic change, and exploitation by anglers.

Habitat

The arctic grayling occurs in both ponds/lakes as well as riverine systems; however, these differences make two distinct populations of either adfluvial or fluvial populations. Cool temperatures are needed to sustain populations, and a gravelly substrate is needed for breeding purposes.

Management

The Fluvial Arctic Grayling Workgroup (FGW) developed a plan to research, protect, and restore fluvial arctic grayling (FGW 1995). A primary objective was to develop a brood stock from wild Big Hole River arctic grayling to preserve their genetic identity. Gametes were collected from spawning arctic grayling in the Big Hole River between 1988 and 1992 until a sufficient founding population was represented (Leary 1991). Progeny of the brood stock with genetic diversity equivalent to the wild stock were available in 1995. Arctic grayling derived from the brood may be used to augment the Big Hole River population, if necessary, and to reestablish other populations within their native range.

Another objective of FGW is to expand the range of fluvial arctic grayling beyond the Big Hole River basin. Kaya (1992b) identified streams suitable for reintroductions of fluvial grayling. Experimental reintroductions have occurred in Cougar Creek, Yellowstone National Park, and in the West and East Gallatin rivers using progeny of the brood stock. Intensive reintroduction efforts in 1997 for the Ruby River of southwestern Montana and the Firehole and Gibbons rivers in Yellowstone National Park occurred and are being monitored at this time.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Low flows during severe drought decrease survival of older arctic grayling due to high water temperatures, increased susceptibility to predation, and diminished habitat volume	Riparian rehabilitation projects to identified degraded habitats on the Big Hole River
Displacement by non-native rainbow and brook trout	Less stocking of non-native fish
Arctic grayling are easily caught by anglers and are susceptible to overharvest	Increased management of harvest
Riparian vegetation and streambanks effected by range or forest management practices, mass willow removal, and dewatering of the river for agricultural uses have negatively impacted fish habitat	Support management of grazing to maintain riparian vegetation and streambank and channel stability in excellent condition
Blockage of fish passage by irrigation diversions	Decreased water runoff for irrigation purposes to increase stream volumes

Management Plans

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Sturgeon Chub (*Hybopsis gelida*)

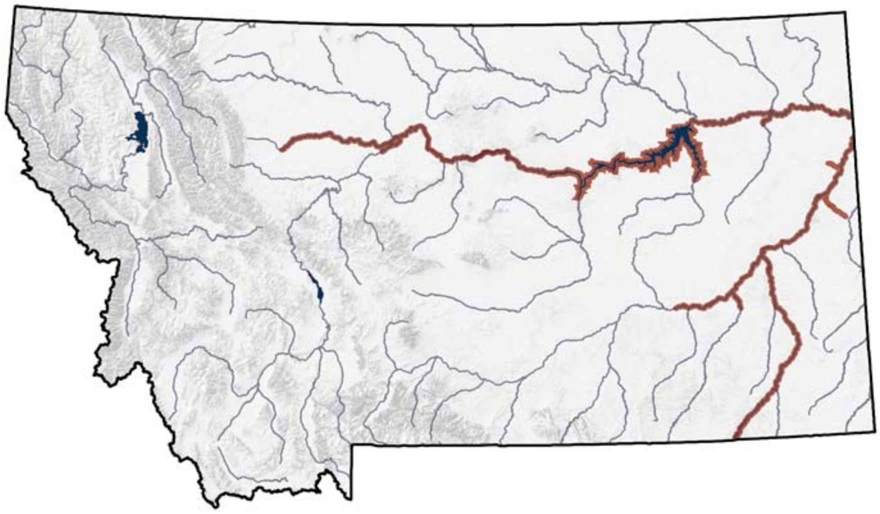

Figure 54. Distribution of the Sturgeon Chub

Range

The sturgeon chub is indigenous to the Missouri-Mississippi river basins from Montana to Louisiana (Lee et al. 1980; Werdon 1993). Historically, sturgeon chub have been collected in small numbers from only a few locations in Montana, so the Montana Department of Fish, Wildlife & Parks designated it a state species of special concern more than two decades ago (Holton 1980). Werdon (1993) reported the sturgeon chub was in possible danger of extinction over much of its former range, including all relevant Montana waters except the Powder River. However, recent collections of this species show it is more widespread and abundant than previously understood. Prior to 1975 only four collections of sturgeon chub from Montana were known. The first collection was taken from an unknown site on the Milk River (Girard 1856), and three collections were reported more than 100 years later from the Yellowstone River drainage (Bailey and Allum 1962; Brown 1971). Collections from 1975–1982 determined that chubs were also present throughout the Powder River (Rehwinkle 1978), in the lower Tongue River (1980), and in the lower Teton and the middle Missouri rivers (Gardner and Berg 1982).

Between 1990 and 1995, collections verified the persistence of sturgeon chub in much of their previously known range and established major range extensions. Sturgeon chub are still present in the Powder River (Werdon 1993; Gould 1994), Lower Yellowstone River (Werdon 1993; 1994 MSU collections by Bramblett et al.), and middle Missouri River (1994 MSU collections by Gardner and Grisak). Furthermore, collections from 1993 to 1995 have yielded significant up- and downstream range extensions in the lower Yellowstone (MSU collections by Bramblett et al.; Ruggles 1997; Stewart 1994), middle Missouri (MSU collections by

Gardner and Grisak), and the lower Missouri rivers (Tews 1993; Ruggles 1997). In total, sturgeon chub recently have been found over some 650 kilometers in three Montana rivers (Gould 1994). However, sampling has not been able to establish their continued existence in the lower Teton and Milk rivers (Gould 1994).

Habitat

Sturgeon chub are highly adapted to life in turbid waters. They have small eyes and many external papillae on their bodies and fins, probably to aid in locating food (Cross 1967; Pflieger 1975). Chub are most closely associated with sites having moderate currents and depths and sand or rock substrates (Baxter and Simon 1970; Brown 1971; Lee et al. 1980). In the Powder River, sturgeon chub were taken most frequently at sites with depths less than 51 cm and depth velocities of less than 90 cm/s at 0.6 depth (Stewart 1981; Werdon 1992; Gould unpublished data).

Management

No management plan for this species exists in Montana. Recommendations for operating reservoir and irrigation projects should be developed for improving and maintaining sturgeon chub populations and habitats in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat alteration by dam operations, reducing turbidities and/or altering temperature and flow regimes	Conservation practices on large rivers in eastern Montana
Channelization of the Missouri River due to irrigation operations and development	Support sustainable irrigation projects
Decreased range and abundance of prey aquatic insect larvae due to dam construction and snag removal	Increased monitoring and survey efforts in eastern Montana designed to monitor population trends and range expansion or loss and collect additional information on life history and ecology
Removal of wild individuals used for bait fish	Educate the public on the necessity of native species
Predation by non-native fish	Consider preparing a management plan for the sturgeon chub or include it into other comprehensive taxonomic plans
Low stream flows probably have eliminated some peripheral sturgeon chub populations in smaller streams	Repopulate smaller tributaries such as Teton, Milk, and Tongue rivers to establish periphery populations

Management Plan

None

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Sicklefin Chub (*Hybopsis meeki*)

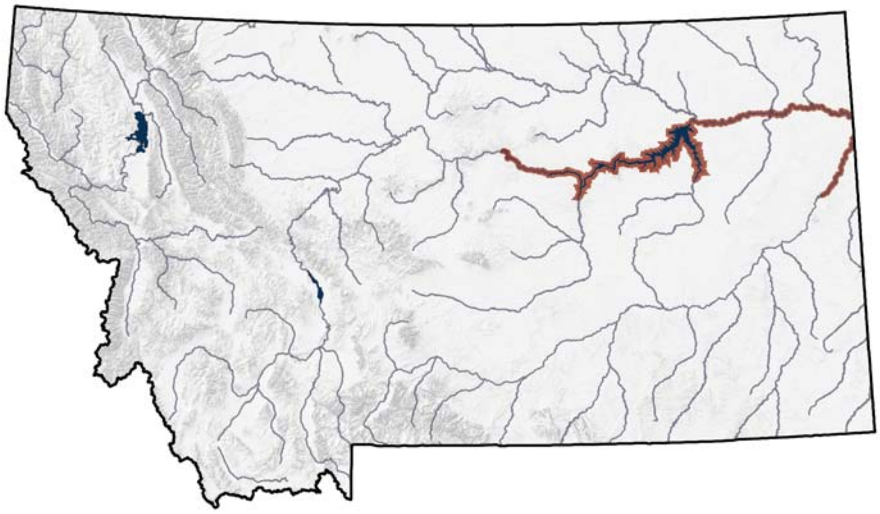

Figure 55. Distribution of the Sicklefin Chub

Range

The first observation of sicklefin chub in Montana was in 1979 in the middle Missouri River upstream of Fort Peck Reservoir (Gould 1981; Gardner and Berg 1982). Until this time they were unknown to exist in the state most likely because of the lack of sampling efforts in eastern Montana. At present, the distribution of sicklefin chub in Montana includes the middle Missouri River from Cow Island downstream to the headwaters of Fort Peck Reservoir (Grisak 1996), the lower Missouri River from the mouth of the Redwater River to the Yellowstone River confluence (Liebelt 1996), and the lower Yellowstone River, from the Intake Diversion Dam to the confluence with the Missouri (Ruggles 1997). As of 1997, the known range of sicklefin chub encompasses nearly 280 kilometers of river in the Missouri and Yellowstone drainages.

Habitat

Spawning occurs in primary channel areas of the large turbid rivers that sicklefin chub inhabit. The spawning period is during the summer months and probably occurs over a wide time span, similar to other big river species. Young-of-the-year sicklefin chub have never been collected, and their early life history remains a mystery. Although the species has been sampled from shallow water and a rocky substrate, there seems to be a general preference for deeper water and a sandy substrate. Unlike the sturgeon chub, all of the Montana captures have been from only the Missouri and Yellowstone rivers, indicating a strong preference for large, turbid rivers.

Management

No management plan for this species exists in Montana. The lack of proper monitoring of these populations could lead to their demise by virtue of not recognizing if and when they are in jeopardy of becoming extirpated by any artificial or natural entity. Recommendations for operating reservoir and irrigation projects should be developed for improving and maintaining sicklefin chub populations and habitats in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat alteration by dam operations, reducing turbidities and/or altering temperature and flow regimes	Conservation practices on large rivers in eastern Montana
Channelization of the Missouri River due to irrigation operations and development	Support sustainable irrigation practices
Decreased range and abundance of prey aquatic insect larvae due to dam construction and snag removal	Increased monitoring and survey efforts in eastern Montana designed to monitor population trends and range expansion or loss and collect additional information on life history and ecology
Removal of wild individuals used for bait fish	Educate the public on the necessity of native species
Predation by non-native fish	Consider preparing a management plan for the sicklefin chub or include it into other comprehensive taxonomic plans

Management Plan

None

Citations

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Pearl Dace (*Margariscus margarita*)

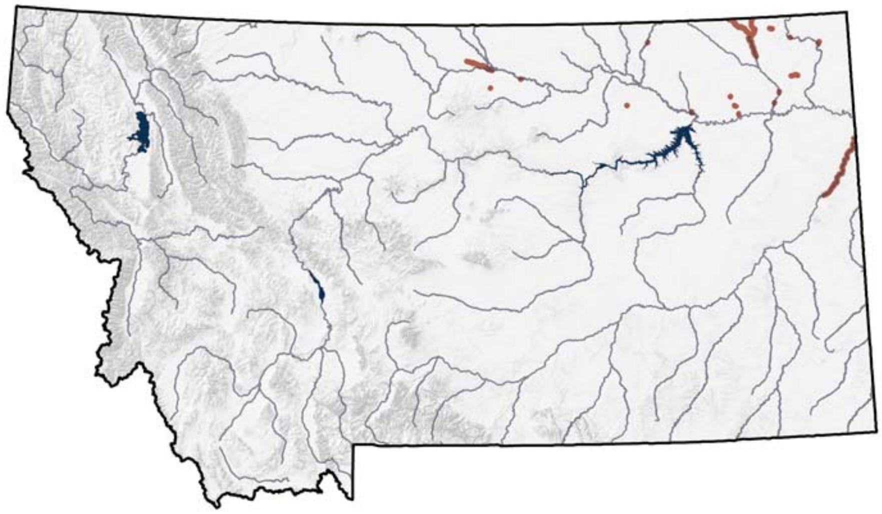

Figure 56. Distribution of the Pearl Dace

Range

Montana contains the southwestern periphery of the continental range of the pearl dace. In Montana, pearl dace occur only in the Missouri River and Saskatchewan River basins. Most known pearl dace localities are in south-flowing tributaries to the Missouri River downstream of its confluence with the Milk River, in the Milk River drainage, or on the Blackfeet Indian Reservation in Glacier County and in Glacier National Park (Schultz 1941; Gould and Brown 1968; Brown 1971; Holton and Johnson 2003; Stash 2001; Bramblett, unpublished data; Robbin Wagner, U.S. Fish and Wildlife Service, personal communication, January 2004).

Two previously reported localities for pearl dace in the lower Yellowstone River (Gould and Brown 1968; Brown 1971; Holton and Johnson 2003) were probably attributable to misidentified creek chubs. The Gould and Brown (1968) collection was reexamined, and the putative pearl dace was found to be a creek chub (William R. Gould, Montana State University, personal communication, January 2004). Other surveys have failed to find pearl dace in the Yellowstone River basin in Montana (Elser et al. 1980; Bramblett, unpublished data). Pearl dace appear to be a glacial relict in Montana, as they are most commonly found in formerly glaciated portions of the plains regions.

Habitat

Pearl dace occur in lakes, cool bog ponds, creeks, and cool springs (Scott and Crossman 1973). Little habitat-related information exists for this species in Montana. At four stream locations where pearl dace were captured in northeastern Montana, average stream widths ranged from 5.4 to 11.8 meters, average thalweg depths ranged from 0.4 to 1.4 meters, substrates ranged from 53 to 100 percent fine substrate (less than 0.06 mm), and aquatic macrophytes were sparse to very heavy (less than10 to more than 75 percent coverage; Bramblett, unpublished data). Eleven fish species were associated with pearl dace in seven collections from four sites on four Montana streams.

Pearl dace appear to prefer cool to cold water temperatures. In Canada, pearl dace were more often found to co-occur with brook trout (*Salvelinus fontinalis*) and mottled sculpin (*Cottus bairdi*) at water temperatures of 15.8 to 16.6 degrees C than with smallmouth bass (*Micropterus dolomieu*) and rock bass (*Ambloplites rupestris*) at 20.8 to 21.5 degrees C (Becker 1983). The upper lethal temperature for pearl dace was found to be 31.1 degrees C (Becker 1983). In the southernmost part of their range in Maryland and Virginia, pearl dace were found in streams that were cool in summer and warm in winter, with substantial spring-water input (Tsai and Fava 1982). In Montana, pearl dace were captured in streams with daytime water temperatures from July through September ranging from 9.6 to 23.1 degrees C (Bramblett, unpublished data).

Management

Montana Fish, Wildlife & Parks classifies the pearl dace as a species of special concern. The primary management task is to monitor the status of the species in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Limited distribution in Montana renders it vulnerable to extirpation from the state	Consider preparing a management plan for the pearl dace or include it into other comprehensive taxonomic plans
	Fish surveys supported by voucher specimens should be conducted in streams across the range (including areas of historical records) of the species to better determine its geographic range
Populations vulnerable to predation and competition	Reduce stocking of non-native fish (especially pike) that may compete or prey on this species
Collected by anglers seeking bait minnows	Educate anglers of importance of native fish

Anthropogenic stressors that increase water temperatures	Conservation of prairie streams to include less livestock use, increase riparian quality, and decrease fertilizers and nutrients used

Management Plan

None

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Blue Sucker (*Cycleptus elongates*)

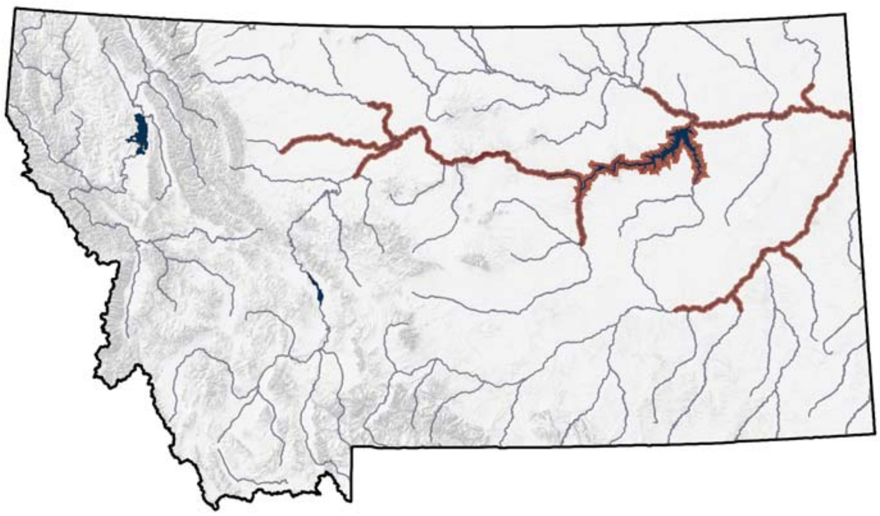

Figure 57. Distribution of the Blue Sucker

Range

In Montana, blue suckers are found in the Missouri River as far upriver as Morony Dam near Great Falls and in the Yellowstone River upriver of Forsyth. During their spawning season, blue suckers have been found in many of the major tributary streams. There have been very few blue suckers sampled in Fort Peck Reservoir, indicating their avoidance of lake environments (AFS website 2003).

Habitat

The blue sucker is adapted for life in swift currents with high turbidity. This fish prefers swift current areas of large rivers, feeding on insects in cobble areas (Moss et al. 1983). In the spring blue suckers migrate upriver and congregate in fast rocky areas to spawn. Large numbers have been observed migrating up tributary streams to spawn. The Tongue, Marias, Milk, and Teton rivers are the tributary streams most heavily used.

Management

Management of the blue sucker consists primarily of routine monitoring of population status and habitat protection. Currently, there is no management plan for blue suckers in Montana. The blue sucker is considered an indicator species for ecotype health because of its habitat-specific requirements. Current monitoring information indicates the populations are in stable condition.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat changes and fragmentation caused by large dams that block passage to spawning grounds, alter stream flow, and eliminate peak flows that initiate spawning runs. Dams also discharge cold, clear water as opposed to the warm, turbid waters in which these species evolved	Consider preparing a management plan for the blue sucker or include it into other comprehensive taxonomic plans
	Regulate water regimes to be more closely tied to natural water regimes
Channelization of large lotic systems	Protect natural minimum instream flow reservations
Changes in riparian habitat and less regeneration of woody trees and understory	Continue conservation of habitats by managing grazing in riparian areas

Management Plan

None

Citations

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Trout-perch (*Percopsis omiscomaycus*)

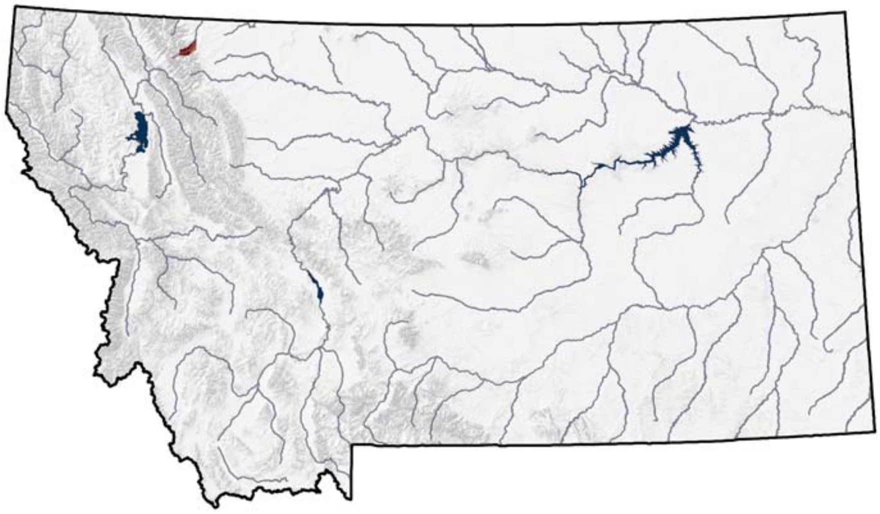

Figure 58. Distribution of the Trout-perch

Range

In Montana, the trout-perch occurs in the South Saskatchewan River basin, which drains northeastern Glacier National Park and the northwestern portion of the Blackfeet Indian Reservation. Trout-perch were not reported in Montana until 1968 (Gould 1969), and the only Montana collection records are from Lower St. Mary Lake (Gould 1969; Brown 1971) and the associated St. Mary canal (Holton and Johnson 1996). Trout-perch have not been reported in other areas of the South Saskatchewan River basin in Montana, such as the Belly River and Waterton Lake, but they may occur there, as this basin has not been surveyed extensively (Brown 1971; L. Marnell, National Park Service, personal communication, 2000). Moreover, trout-perch are commonly collected in the Belly River and Waterton Lake systems in Alberta (T. Clayton, Alberta Environment, unpublished data, 2001). Trout-perch have also been captured in the Milk River in Alberta (T. Clayton, Alberta Environment, unpublished data, 2001). The Milk River basin is outside of the trout-perch's native range. Trout-perch apparently gained access to the Milk River basin via the St. Mary canal, which connects the St. Mary River system with the North Fork Milk River.

Habitat

In Montana, trout-perch are regularly captured in Lower St. Mary Lake and the St. Mary canal using backpack and boat electrofishing (R. Wagner, U.S. Fish and Wildlife Service, personal communication, 2000). In the lake they are associated with large rocky cover and are not captured over sandy or silty substrates. During daylight periods they appear to use rocks as hiding cover, while at night they are out of, but in close proximity, to rocky cover. In the St. Mary canal, trout-perch have been captured in winter after the canal headgate is closed. In the canal, trout-perch are found in residual pools associated with large rocky cover or concrete riprap (R. Wagner, U.S. Fish and Wildlife Service, personal communication, 2000). Scott and Crossman (1973) report that trout-perch are typically a lake species in eastern Canada, but that they also occur in streams, including somewhat turbid streams, in western Canada. Trout-perch are reported to undergo diel migrations into shallower inshore waters of lakes at night (Brown 1971; Eddy and Underhill 1974; Becker 1983; Nelson and Paetz 1992).

Management

Montana Fish, Wildlife & Parks classify trout-perch as a nongame wildlife species. They are too small to be sought by anglers. The entire known range of trout-perch in Montana is within Glacier National Park and the Blackfeet Indian Reservation. Neither entity has a specific management program for trout-perch.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Sensitive to pollution and sedimentation associated with row crop agriculture, as well as channelization	Consider preparing a management plan for the trout-perch or include it into other comprehensive taxonomic plans
	Conservation of riparian areas, including increased restrictions on fertilizers and nutrients seeping into waters
Sensitive to warm water temperatures	Surveys in the Belly River and Waterton Lake in Montana are needed to establish the presence of trout-perch in these waters
Impoundments restricting proper movement of populations	Manage irrigation and development to improve connectivity of habitat

Management Plan

None

Citations

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Burbot (*Lota lota*)

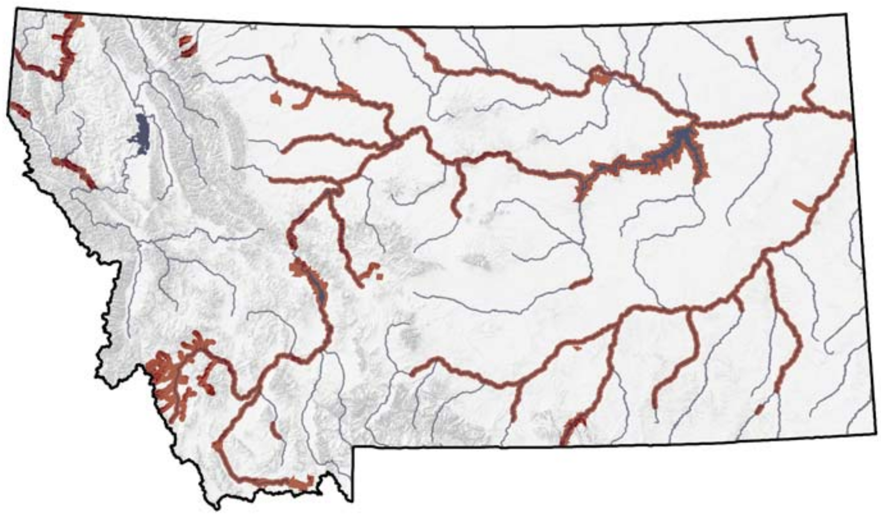

Figure 59. Distribution of the Burbot

Range

Burbot are found in all three major river drainages in Montana (Clark Fork, Missouri, and Yellowstone). Burbot, also known as ling, are usually found in larger streams and cold, deep lakes and reservoirs.

Habitat

Burbot habitat includes large rivers and cold, deep lakes and reservoirs. In lakes, they are mostly associated with bedrock and rubble substrates (Edsall et al. 1993). If soft substrates are present, burbot may construct burrows (Boyer et al. 1989). River requirements are less understood, but some believe they were originally restricted to backwater areas of cooler high-altitude systems (McPhail and Paragamian 2000).Their long cylindrical shape and poor swimming ability prevents them from inhabiting high current areas (Jones et al. 1974). Most spawning is believed to occur in lakes (Scott and Crossman 1973; McPhail and Paragamian 2000); however, reproduction may also occur in rivers and streams (Cahn 1936; Arndt and Hutchinson 2000; Paragamian 2000). They spawn in shallow water, usually in rocky areas.

Management

Burbot management was once poorly understood or nonexistent (McPhail and Paragamian 2000). However, with the completion of a new status paper (Jones-Wuellner and Guy 2004) and routine surveys in the Missouri River by Fish, Wildlife & Parks, we are beginning to have a better grasp on biological information for burbot. The burbot population in the Kootenai River below

Kootenai Falls is declining, and because of this, the burbot has been petitioned for listing as a federally endangered species. The decline in this population has been attributed to the operation of Libby Dam for hydroelectric power flood control. Similar declines in burbot populations have been seen in other states following dam construction.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Overharvest	Evaluate angler exploitation rates and determine sustainability of wild populations
Poorly understood life history traits and habitat requirements	Increased surveys to gain basic population characteristics (e.g., population sizes, age structure, and condition)
Reduced numbers in river systems due to impoundments	Work with managing authorities to encourage reservoir management to mimic a natural hydrograph

Management Plan

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Sauger (*Sander canadensis*)

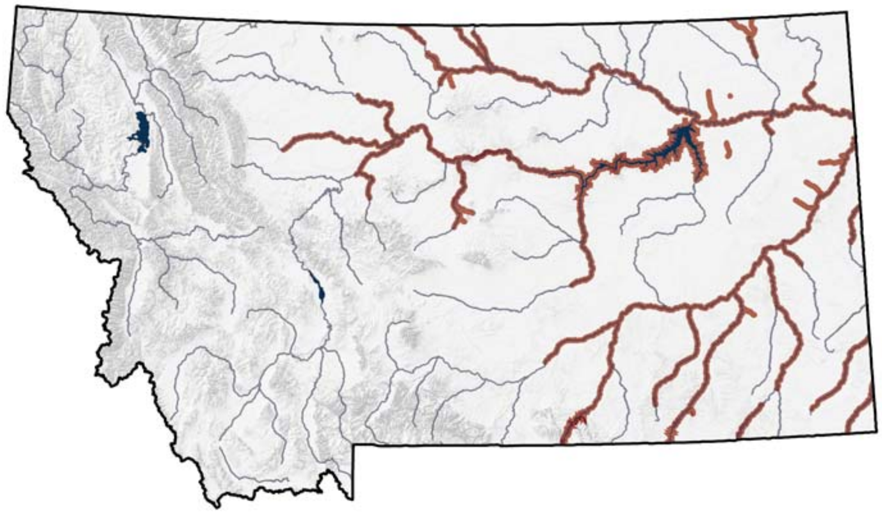

Figure 60. Distribution of the Sauger

Range

The sauger is one of the most widely distributed North American fishes, with a historical range extending across most of central and eastern North America from the St. Lawrence-Champlain system south, west of the Appalachian Mountains, to the Tennessee River in Alabama, and northwestward to central Montana and Alberta (Scott and Crossman 1973).

In Montana, historical distribution included the Missouri River and its major tributaries downstream of Great Falls and the Yellowstone River and its major tributaries downstream of the Clark Fork (McMahon and Gardner 2001). Current distribution in Montana has declined by 53 percent from historical levels with the largest losses occurring in tributaries (McMahon and Gardner 2001). Current distribution in the Missouri River drainage is confined to the primary stem of the Missouri and small parts of the previously widely occupied Marias, Musselshell, and Milk rivers (McMahon and Gardner 2001). Sauger are considered rare or absent in other major tributaries such as the Teton, Judith, and Poplar rivers (McMahon and Gardner 2001). In the primary stem of the Yellowstone River, distribution is now considered limited to downstream of Rosebud Creek; sauger are considered rare or absent in major tributaries such as the Big Horn and Tongue rivers, although a small, partially isolated population may persist in the upper Powder River (McMahon and Gardner 2001; B. Stewart, Wyoming Department of Game and Fish, Sheridan, WY, personal communication).

Habitat

Sauger typically occur in large turbid rivers and shallow turbid lakes (Becker 1983). Turbidity is an important delineator of suitable habitat for sauger. Physiological adaptations, such as a highly advanced light-gathering retina, allow sauger to thrive in low-light environments (Ali and Anctil 1977; Crance 1987). At cool water mesotherms, sauger have a fairly wide range of thermal tolerance with occupied temperatures ranging from 1 to 30 degrees C and a physiological optimum of 18 to 24 degrees C (Crance 1987; Carlander 1997).

Sauger are heavily dependent throughout their life histories on unimpeded access to the wide diversity of physical habitats that are present in large river systems. They are considered to be the most migratory percid (Collette 1977). Their migratory behavior, which is primarily related to spawning, is well documented throughout their range with annual movements of up to 600 kilometers between spawning and rearing habitats (Nelson 1968; Collette et al. 1977; Penkal 1992; Pegg et al. 1997; M. E. Jaeger, Montana State University, unpublished data). Sauger are highly selective for spawning sites and commonly travel long distances to aggregate in a relatively few discrete areas to spawn (Nelson 1968; Nelson 1969; Gardner and Stewart 1987; Penkal 1992). Although primary stem spawning does occur (Jeager 2004), it has been suggested that sauger populations are strongly reliant on access to large tributaries for spawning (Nelson 1968; Gardner and Stewart 1987; Penkal 1992; Hesse 1994; McMahon 1999). Spawning locations are associated with unique geomorphic features, such as bluff pools and bedrock reefs, and rocky substrates over which sauger broadcast their eggs (Nelson 1968; Gardner and Stewart 1987; Hesse 1994; Jeager 2004). During a 10- to 12-day period following emergence, it is thought that larval sauger drift long distances downstream—up to 300 kilometers—prior to gaining the ability to maneuver horizontally and begin feeding (Nelson 1968; Penkal 1992; McMahon 1999). Juveniles rear in side channels, backwaters, oxbows, and other off-channel habitats during spring and summer before shifting to primary channel habitats in autumn (Gardner and Berg 1980; Gardner and Stewart 1987; Hesse 1994). Adult sauger also use off-channel and channel-margin habitats during the spring and early summer periods of high flow and turbidity, and then move to deeper primary channel habitats in late summer and autumn as decreasing flows and turbidities cause suitable off-channel habitats to become unavailable (Hesse 1994; M. E. Jaeger 2004).

Management

Montana boasts some of the most pristine large-river habitat in the United States. To promote the conservation and recovery of sauger to acceptable levels, an interagency agreement is being completed at this time by Fish, Wildlife & Parks to sustain and advance suager populations.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Water withdrawals resulting in low river flows	Minimize the diversion of water from river channels and limit processes such as channelization and streambank armoring that result in loss of important off-channel habitats
Reservoir operation that alters the natural hydrograph	Flow releases from dams can be regulated throughout the year to maximize spawning success and year-class strength of sauger (Nelson 1968; Walburg 1972)
	Preservation of natural hydrographs, natural processes of channel formation, and high degrees of connectivity where sauger currently exist
Barriers that negatively influence spawning movement patterns and larval drift	Removal of primary stem and tributary impoundments
	Improved passage at several irrigation-related migratory barriers
Channelization and loss of side channel habitat for larval and juvenile sauger	Install fish screens and return structures to minimize entrapment of fish in irrigation canals
Hybridization with walleye	Continue surveying and monitoring of species
Negative interactions with other species such as walleye and smallmouth bass	Research to better understand interaction between sauger and exotic species
Overexploitation	Increase angler harvest limits in certain areas

Management Plan

Montana Department of Fish, Wildlife & Parks. 2004. Memorandum of Understanding and Conservation Agreement for Sauger (*Sander canadensis*) in Montana. 23 pp. Draft (in progress).

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